

The opinion in support of the decision being entered today was *not* written for publication and is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* TINGHAO F. WANG

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Appeal 2007-0488  
Application 10/071,809  
Technology Center 1700

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Decided: February 28, 2007

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Before TERRY J. OWENS, THOMAS A. WALTZ, and  
CATHERINE Q. TIMM, *Administrative Patent Judges*.

WALTZ, *Administrative Patent Judge*.

DECISION ON APPEAL

In a prior Decision dated Jan. 24, 2006, in an appeal in this application (Appeal No. 2006-0293), this merits panel reversed all grounds of rejection on appeal and remanded the application to the jurisdiction of the Examiner for consideration of a rejection based on 35 U.S.C. § 112, first paragraph, for lack of enabling disclosure (*see* the Decision dated Jan. 24, 2006, pp. 6-7). Pursuant to this remand, the Examiner rejected claims 1, 3-12, 14, 15, 21-23,

25, and 27, the only claims pending in this application, under 35 U.S.C. § 112, first paragraph (Supplemental Examiner's Answer dated May 24, 2006, p. 2). Appellant has submitted a Reply Brief dated July 24, 2006, in response to the Examiner's rejection, requesting the "appeal be maintained" (Reply Br. cover letter). Accordingly, this is a decision on this appeal (Appeal No. 2007-0488). We have jurisdiction pursuant to 35 U.S.C. § 134.

According to Appellant, the invention is directed to a method of etching a metal silicide layer while fabricating an integrated circuit using a chlorine/oxygen gas environment at a pressure of about 2 to 40 mili-Torr and an oxygen concentration of greater than or equal to 25% by volume to selectively etch the metal silicide over polysilicon at a ratio of at least 30:1 (prior Decision, pp. 1-2; Reply Br. 1). Independent claim 1 is illustrative of the invention and is reproduced below:

1. A method comprising, etching a metal silicide layer during fabrication of an integrated circuit in a  $\text{Cl}_2/\text{O}_2$  environment having an  $\text{O}_2$  concentration of greater than or equal to 25% by volume,  
wherein the  $\text{Cl}_2/\text{O}_2$  environment is provided at a pressure of approximately 2-40 mili-Torr, and wherein the etching is a metal silicide etch that is selective to poly-silicon with a ratio of etch rates of at least 30.

The Examiner has relied upon the following reference as evidence to support the rejection:

Nojiri, "*High rate and highly selective anisotropic etching for  $\text{WSi}_x/\text{poly-Si}$  using electron cyclotron resonance plasma*," 14 J. Vac. Sci. Technol., B, 1791-95 (May/June 1996).

### ISSUES ON APPEAL

Claims 1, 3-12, 14, 15, 21-23, 25, and 27 stand rejected under 35 U.S.C. § 112, first paragraph, for lack of enabling disclosure (Supplemental Answer 2).

Appellant contends that Nojiri does not contain any examples of etching a metal silicide layer employing an oxygen concentration above 25%, but only extrapolates the etch rate of  $WSi_x$  during etching employing oxygen concentrations above 20% (Reply Br. 2). Appellant contends that the data (experimental values) in Nojiri is consistent with the claimed process, and only the projection in Nojiri is inconsistent with the process as claimed (Reply Br. 4). Appellant contends that there is no evidence, i.e., experimental results, inconsistent with the supporting disclosure, and thus no reason to doubt the truth or accuracy of any statement in the supporting disclosure (Reply Br. 5).

The Examiner contends that Nojiri discloses an example of etching a metal silicide layer where the etching stops at an oxygen concentration of 25%, and therefore Appellant's Specification does not enable one of ordinary skill in the art to achieve the desired result (Supplemental Answer 2).

Accordingly, the issue in this appeal is as follows: does Nojiri present sufficient evidence to doubt the truth or accuracy of any statement in Appellant's supporting disclosure on how to make and use the claimed invention?

We determine that the evidence supplied by Nojiri is sufficient to doubt the truth or accuracy of Appellant's supporting disclosure. We also determine that the evidence in Nojiri shows that the claimed objective

cannot be met by following the process as claimed. Therefore we AFFIRM the rejection on appeal essentially for the reasons stated in the prior Decision (remand), the Answer, as well as those reasons set forth below.

### OPINION

We determine the following factual findings from the record in this appeal:

- (1) claim 1 on appeal requires a chlorine/oxygen environment having an oxygen concentration of equal to or greater than 25% by volume at a pressure of 2-40 mili-Torr to yield a metal silicide etch selective to polysilicon with a ratio of etch rates of at least 30 (see claim 1 on appeal above);
- (2) Nojiri discloses the same process and conditions as recited in claim 1 on appeal but finds that the etching of the  $WSi_x$  stops when the oxygen concentration is about 23% (see Fig. 2 on page 1792).<sup>1</sup>

The initial burden of presenting reasons or evidence to support a rejection based on lack of enabling disclosure under the first paragraph of § 112 rests with the Examiner, and, if met, the burden shifts to Appellant. *See In re Wright*, 999 F.2d 1557, 1561, 27 USPQ2d 1510, 1513 (Fed. Cir. 1993). The Examiner must present sufficient reasons or evidence to doubt the truth or accuracy of any statement in Appellant's supporting disclosure. *See In re Marzocchi*, 439 F.2d 220, 224, 169 USPQ 367, 369-70 (CCPA 1971). The claimed objective must be met by following the process as

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<sup>1</sup> Appellant does not dispute or contest that the pressure and gas concentration (implicitly volume %) taught by Nojiri are within the scope of the process conditions as disclosed and claimed by Appellant.

claimed. *See In re Mayhew*, 527 F.2d 1229, 1233, 188 USPQ 356, 358 (CCPA 1976).

Applying these legal principles to the factual findings of this appeal, we determine that the Examiner has met the initial burden by presenting Nojiri, which is sufficient evidence to question the truth or accuracy of Appellant's supporting disclosure. We further determine that the burden of proof has been shifted to Appellant, and Appellant has not met this burden. Our reasons follow.

Appellant repeatedly contends that the only evidence that can be presented by the Examiner to doubt the truth or accuracy of the supporting disclosure must be examples, i.e., concrete experimental data (Reply Br. 4-5). However, we find no limitation for the type of evidence needed by the Examiner to substantiate a rejection for lack of enabling disclosure, i.e., actual examples vs. interpolation. *See In re Marzocchi, supra*. Contrary to Appellant's arguments (Reply Br. 3), we determine that Fig. 2 of Nojiri shows that the etch rate of  $\text{WSi}_x$  is at zero (nm/min) at approximately 23% oxygen concentration (see the "black circle" at the end of the  $\text{WSi}_x$  graph curve). Since Nojiri teaches that the "etching suddenly stops" for poly-Si at oxygen concentration above 25%, and this corresponding "white circle" is higher in etching value than the "black circle" representing the value for  $\text{WSi}_x$  at the end of the graphed curve, we determine that this "black circle" must also represent a stop of etching or zero% etch. In view of the teachings of Nojiri regarding the process at 23% oxygen concentration, and the interpolation of the results for 25% or greater oxygen concentration, we determine that the Examiner has met the initial burden of establishing doubt for the truth or accuracy of Appellant's supporting disclosure. We

determine that one of ordinary skill in this art would have expected similar results (i.e., zero % etching) for oxygen concentrations greater than 23% in the process of Nojiri. *See* Fig. 2 of Nojiri at page 1792. Appellant admits that the process as claimed is “inconsistent” with the “projection” or extrapolation of the data in Fig. 2 (Reply Br. 4).

Additionally, Appellant has not explained how the claimed objective (a selective etch rate of at least 30) can be met by following the process as claimed. The only example in the Specification does not follow the process as recited in claim 1 on appeal, but includes a “breakthrough etch” using carbon tetrafluoride (Specification 7:17-19).

For the foregoing reasons, we determine that the Examiner has established a prima facie case of lack of enabling disclosure, which case Appellant has not adequately rebutted by arguments or evidence. Therefore, we affirm the sole rejection on appeal.

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The decision of the Examiner is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv)(2006).

AFFIRMED

sld/hh

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